

The Emerging Information Professional

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THERE ARE SO MANY CLICHÉS about this being the Information Age that additional pronouncements on the subject seem destined to put readers to sleep. How many people, though, really understand the role of information in society? Should information and its curators be treated with respect and provided with ample resources? What makes them so deserving?

There are many reasons to value information. None is more significant than the fact that the appropriate use of timely information can expand the resources available to society as a whole and to its members individually. The expansion of physical resources is a case in point; for instance, consider the use of railroad tracks. Trains must be scheduled far enough apart to ensure that two trains traveling in opposite directions will not be on the same section of track at the same time. The more information the transportation manager has about the exact position of each train at each minute, the closer together the trains can run. The information on train positions actually expands the resource of railroad tracks by making possible more use of the same tracks on any given day. The ability both to gather and to process data rapidly into information also makes possible more effective use of capital resources, which in turn enables the provision of more goods and services using the same amount of capital resources. Anyone who can provide two items to a society where only one was produced before, *using the same resources*, is very likely to have the respect and support of that society.

Better information can also improve everyday consumer decisions

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and expand individual resources. Consumers who have more information about the range of products available can make choices which better reflect their needs. Knowing that certain garment finishes resist certain stains, the consumer can choose a garment finish well suited to the environment in which the garment will be used. The personal resources of the consumer are thereby expanded because less money and time have to be spent on cleaning the garment. The informed choice is possible only if reasonably complete information on the dimensions of choices is known.

Information can be used to expand the utilization of other human resources as well. Consider, for instance, the choice of employment. Information such as occupational outlooks helps a person to decide whether to become, for example, a librarian or a technical writer. Information networks such as employment advertisements and job hotlines help the trained graduate locate a position. Without them one would be forced to depend solely on friends and family to learn about job openings; in the past, such methods have proved somewhat limiting, leading to discriminatory hiring and to underutilization of skilled people.

In the development as well as the utilization of the human resource, information has the power to expand the raw material. Teachers of exceptional children provide a good example. With information on new techniques of instruction, the teacher can present material more clearly. This allows time either to complete more lessons or to reinforce material already presented. The result either way is a better-prepared student with an improved capacity to contribute to society — a result of information being available.

If information can be accurately described today as valuable, it is well on its way to becoming invaluable tomorrow. While it is quite reasonable to expect that many of the current trends in information usage for industrial, consumer and human development decisions will continue, there also appear to be other directions which are new developments in information utilization. Some of these are the result of the enhanced analytical processing now possible because of the development of digital computers.

The ability to process very large amounts of data by computer has led to many new developments in science and society. Not the least important of these has been the trend toward assembling and preparing very large collections of data for analysis. These data may result from surveys of human opinion or of natural environments, observations of economic indicators, or counts of accumulated artifacts. The subject

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matter is widely varied, but all these data collections share some common factors. Because the collection of data and converting data into a form suitable for computer processing require substantial effort, the data gathered are most effective when they can be used for many different purposes. To make this possible, it is necessary to allow subsequent researchers to form and reform their own subsets of the data, and to analyze them using various statistical and analytical programs developed for computer analysis.

Fortunately, allowing for the multipurpose analysis requires only that the data be gathered and reduced to computer form with careful consideration of the regroupings likely to be desired and the probable computer programs to be used for analysis. While this is no small "only," it is being done. The growth of data banks, as these large collections of data for multiple analysis are known, is one of the newest and most exciting challenges in modern library service.

Another new dimension of information utilization brought about by the processing ability of digital computers is the development of large-scale modeling systems. These systems use large quantities of data to produce information about the probable future state of a natural or human environment. One such project of considerable scope and importance today is the reasonably accurate computer models which can predict weather. The reason they are not used as much as every one may wish is that they require immense amounts of data and huge computers for processing. So much data and processing time are necessary to calculate the weather using these models that the day for which weather is being predicted has passed by the time the computer calculations are finished. However, computer designers are making rapid improvements in the speed of both data input and analysis. The day is not long distant when models that utilize huge amounts of data to produce information on future states of the environment will be viable. Information professionals need to be ready both to assist in the process of overseeing the assembly of the huge quantities of data, and to make the information resulting from such models available to the widest audience possible.

Large-scale models are also useful for predicting human activity. It has been recognized by insurance companies for many years that the inability to predict individual deaths does not mean that accurate predictions on the number of deaths in a given age group cannot be made. Models predicting human behavior also require large quantities of data as input. Like the models of natural systems, they produce information that is of considerable interest and significance to patrons.

For information professionals, the challenges of providing service on human systems models are perhaps greater than those of service on natural systems models. Not only can the information professional expect to assist in locating the large data input, but for human systems the data-gathering discipline is more variable than that for natural systems. The discipline can affect both the accuracy and the valid uses of the data. Because of this, it is important that information on the data-gathering discipline be complete and readily available both to those who would use the data and to those who would use the information the models yield. Again, it is the responsibility of information professionals to see that this important information is available.

There is yet another problem related to human systems models. The data required usually pertain to the behavior of individuals, and many people are reluctant to allow data to be gathered on their personal behavior. They fear that the data will be used in ways detrimental to them. Yet, without keeping data on many individuals, models cannot be developed and used. In the past, the factors which constrained researchers from "undue prying" were technological; it was simply too difficult to collect and store massive quantities of data on millions of citizens. That form of protection is quickly vanishing. A new balance will have to be found between the fears of undue prying on the part of the citizens and the desire for data on every aspect of a person's life on the part of researchers. The conflict between privacy and public need for information will very likely remain one of the significant issues of this century.

One additional trend in information usage is now developing which relates to models of the world. It is now necessary to make planning decisions, based on the best judgments available, that will have consequences for very long periods of time. The information needed to make such long-range decisions is somewhat different from previous needs. One area for which long-range consequences are obvious is in the location of sites for nuclear waste disposal. Nuclear wastes must be stored securely for many decades. Accordingly, the storage sites should be safe from natural and human disasters (as nearly as possible) for many centuries. Location and selection of such sites requires models that use information about such considerations as geological conditions, likely future population levels, and other factors not yet even identified. Whenever decisions must be made which will have consequences for many people, either immediate or long-range, it seems that the demand for accurate information on which to base such decisions will increase. Since technology and population both increasingly require decisions of wider and longer-range con-

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sequences, the information professional should expect heightened pressure for better and more accessible data and information.

The growing complexity of social systems and models of them has increased the demand for information goods and services. This demand has spurred the development of entire industries which respond with products and services designed to provide the information required. It has been variously estimated that from one-third to nearly one-half of the American GNP is devoted to develop information goods and services.¹ This figure, however, includes more than information products and services for libraries and their patrons. It includes the entire computer industry because the computing machine is used primarily for processing information. It also counts telephone and other communications industries which transfer information from one place to another. Education expenditures are also incorporated in the information sector of the economy, since education involves the imparting of information to others. The information industry, however, is the part of the information sector of the economy which is of most interest to librarians. The information industry, one of its major spokesmen has stated, consists "of those organizations that are in the business of producing and distributing information products and services."² While this broad definition can still include many organizations which would not generally be identified as information industries (such as the telephone company), it provides a very reasonable working definition.

The first efforts of the information industry were in the production of information products. Book publishing is clearly a part of the information industry. However, the organizations which most readily identify themselves with the information industry are the producers of secondary publications, such as indexes, reference books, and handbooks or directories, which contain material gathered from several original sources in one conveniently organized item. These companies have also led the field in the development of multiple products from a single information source. For instance, the same information may be available in conventional printed format, in microform, and stored in a computer where it may be searched (and part extracted and printed for the patron when desired).

The information industry, like Gaul, has three parts. It consists of (1) private, for-profit companies in the business of preparing and distributing information products and services; (2) not-for-profit organizations, often associated with professional or academic societies, which produce and sell information products and services; and (3) government

agencies which, as part of their mission, produce or gather and make available information products and services. A well-known representative of the private companies is the Institute for Scientific Information (ISI). BioSciences Information Service (BIOSIS) of Biological Abstracts is a good example of the not-for-profit organizations. National Technical Information Service (NTIS) is one active example of the government agencies in the information industry.

Two organizations which exist to further information industry interests are the Information Industry Association (IIA) and the National Federation of Abstracting and Indexing Services (NFAIS). The IIA is a trade association formed in 1969 to promote private enterprise in the information field. Its members are largely for-profit information companies. NFAIS is an organization of not-for-profit and government agencies concerned with the production and distribution of indexing and abstracting tools. Both IIA and NFAIS are called upon to describe the importance of information products to the public and to government bodies when such input is appropriate, and representatives of both have testified before Congress. Both groups are interested in the development of faster, cheaper and more reliable computer processing and telecommunications. In these areas they sometimes join with the library community to present common interests. Libraries and information industries both have a stake in improving the ability to generate and distribute information products.

The fact that several organizations represent the interests of the information industry is not an accident. There is considerable controversy within the industry, however, over which organizations should provide which services and products. Private companies are accused of profiting from information that was created or gathered at public expense, such as funded scientific research or census and economic indicator information. If such information must be sold, some maintain, it should be sold at the lowest possible price. This suggests that government or nonprofit organizations should be its providers. Private companies argue that it is not the creators but the consumers of the information who should be considered when deciding whether an item should be provided by the profit or the nonprofit sector. Their argument is that the taxpayers' money should not be used to finance services and goods which will only benefit specific people. Thus, if the private sector can offer a service, the government should not compete. Private companies hold that government and not-for-profit organizations should reserve their productivity for those

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information products which the private sector cannot economically produce.

One area in which this conflict in the information industry impacts libraries is journal article photocopies. There is clearly a demand for the service of providing to library patrons copies of articles not held by the library. Private companies claim that document delivery services which sell such products do it well, and that both users and original publishers are best served when this service is a profit-oriented activity. Some of the private companies in this business obtain the journals they copy from libraries, and the question of proper compensation to the library has been raised. The controversy became quite heated when NTIS announced that it would offer journal article copies in addition to its other document delivery services. Private companies have contended that a government agency has no business offering a service that they themselves are clearly able to provide. (Librarians are particularly concerned with this controversy both because of the occasional use of their collections for other people's profit and because of their interest in establishing a national periodical center. Librarians believe a national center will provide the material for patrons at the lowest cost. Since it would take profit from private companies, businesses are not in concert with the libraries.)

The problem of how to provide the best products and services at the lowest cost constitutes the major tension between librarians and the information industry as a whole. Librarians have traditionally been committed to providing information whether the patron can pay or not. Need for information has been the major motivation in library decisions. Payment has come from other sources: taxes, tuition or organizational operating budgets. The commitment of the information industry is to develop products and services which will produce an economic return (either a break-even or profit-making situation). Even government agencies which are part of the information industry are usually required to charge for their products in order to recover at least some of the cost of providing the information. Librarians have charged that the information industry does not take enough interest in developing some mechanism for the transfer of resources to ensure that those needing information but unable to pay for it will nevertheless receive it. Information industrialists have argued that libraries are demeaning the value of the information they provide by not making the public aware of the very substantial cost of its provision. Furthermore, for-profit information industries also hold that information products which best meet patron needs will be developed through profit incentive and free-market competition.

In spite of the tensions between them, there is still much to draw the library community and the information industry together. Librarians know quite well that their ability to serve patrons rests in part on the quality of their tools. Thus, the work of the information industry to develop better tools for information retrieval is to the benefit of the library patron. The information industry, for its part, is aware that the prices of many of its products and services are such that libraries will remain the primary market for those items. Even where libraries are not the only market, they are still very strong supporters of informing the public of the availability and value of the product or service. Finally, the information industry and the library community share the realization that the need to develop an information-sophisticated public is of critical importance to the well-being of both.

While it is certainly true that the industry has expended effort in developing many new information products, it would be difficult to say whether the development of these new products and services is a result of supply push or demand pull. Clearly, the suppliers of these products have tried to induce libraries and their patrons to use them, but it also seems that the time for such development was very ripe. Almost twenty years ago, Derek Price commented on the growth and development of information dissemination mechanisms in science. The number of journals being published, Price noted, has grown in a very regular way since the late 1600s. When the number of journals reached approximately 300, a critical mass was reached. The result was the development of a new type of information dissemination tool to help scientists stay abreast of new developments. That tool was the abstract journal. Around 1950 the number of abstract journals had reached the critical mass of 300.³ The time was ripe for new developments.

From the perspective afforded by the late 1970s, it is possible to see that a new technology just being designed in 1950 was to play a critical role in providing the new tools that the situation required. Indeed, digital computers and other technologies have combined to provide a number of new information organization and dissemination tools in years since 1950.

The existence of computer processing helped to bring about the very large data banks that are just beginning to play an active role in providing information. The data banks now available hold material on political opinion, social phenomena, natural resources, and economic development. The data can be transmitted either by sending magnetic tapes from a central collection point to the interested researcher or analyst, or by allowing remote computer terminal access to the central computer where

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the data are held. Once a researcher has determined that a data bank contains elements pertinent to his research, he can use a statistical package to analyze the material for meaningful patterns or trends. By combining the data in novel ways and analyzing them to determine if the observed count is sufficiently unusual to be more than just a matter of random variation, the researcher can ascertain, for example, whether political affiliations of a given ethnic group are changing, whether social unrest is higher in some parts of the nation than others, whether natural resources will be adequate for a new technical development, or whether economic conditions merit investment in new production capacity. These are only some of the questions that data banks allow researchers to study.

The availability of the data in the banks is aided by the development of common statistical packages (such as SPSS), which are being taught at many different places. With these common "canned" programs, the same kind of statistical analysis, using exactly (or almost exactly) the same computer commands, can be done on computers in Seattle, Houston and Atlanta, for example. The researcher can move his project from place to place and not need to learn a new program of analysis every time. This boon has made it possible for researchers to concentrate more on the material to be analyzed and less on computer programming.

The proliferation of data available for analysis, and the fact that researchers can now spend less time concentrating on the "how" of analysis and more on the "what," imply a new challenge for the librarian or other information professional called upon to assist researchers with their information problems. A new type of information must now be stored and retrieved. The researcher needs to know if any data banks hold data suitable for a specific type of analysis and, if so, which ones. It is not just a simple listing of data elements that is required; the researcher will also need to know about the data-gathering and population-sampling disciplines used in order to decide what analytic techniques are appropriate. Further, different computing systems will accept data in differing coding styles and densities, so that somewhere the researcher will have to locate information on the coding and density of the data and what coding and density the computer or computers available to the researcher will accept. These information needs provide a clear challenge to those who would make their work the resolution of the information problems of researchers. And, because these banks are of great potential, using them effectively is an important task.

The value of computers in information dissemination is not limited to analysis of data bank material, significant though that activity is. It

was less than ten years after the first commercial sale of computers that Hans Peter Luhn came up with a technique that would allow information retrieval using computers — the KWIC (keyword in context) index.⁴ Many other retrieval systems which are facilitated by the computer have followed in the years since KWIC indexing's introduction in 1958. Today citation indexes, automatic indexing programs, and on-line bibliographic data bases are also available. All of these computer-aided retrieval systems are designed to enhance the ability of the information professional to serve the patron.

One significant difficulty has developed. The computer tools make it possible to *identify* the material which seems to be of interest to the patron. The job of the information professional, however, is not done until the material is provided to the patron. Initially, the computer was of no help in supplying the items wanted. Systems such as on-line bibliographic data base searching make it easy to list for the patron hundreds of journal articles or reports on a specific topic. However, upon learning that many of them are not in the collection, the patron will become dissatisfied. Some new method of providing these materials was necessary.

One solution employed another new technology, microfilm, to support the development of publication on demand. To date, this technique has been used primarily to provide technical reports rather than journal literature, but the new copyright laws which require that publishers be compensated for copies of journal articles may encourage the use of this technology for journals as well. Basically, publication on demand uses an original report (which may be typed, printed or even computer-photo-composed) and a microfilm camera to produce a microfilm original. Once the original is indexed and stored, it can be retrieved whenever a copy is wanted. Each copy can be produced — usually on microfiche — for a few cents. It is also possible to produce paper copy from the microfilm original at a somewhat higher price using photocopying. Publication on demand has been used very effectively by NTIS and ERIC to make available the material that these two government agencies are charged with collecting. A copy of an entire scientific report can be acquired from NTIS for under \$1.00 and within less than two weeks. The development of this technology has allowed suppliers to keep thousands of works on microfilm and to produce copies only when orders are placed for each item. This means that items of interest to only a very limited number of people can still be made available at a reasonable price.

Document delivery, which was mentioned earlier in conjunction with the information industry, is another method that has been used to

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satisfy the increased demand for access to items not held in a library's collection. Interlibrary loan, of course, is another way to approach the problem. The growing demand for access brought about by the improved tools of the information industry will probably only increase the use of both of these mechanisms.

An additional means of providing better access and retrieval uses the computer to store and search the actual text of the material of interest. This technique, called full-text searching, has two advantages. First, it does not restrict the retrieval system to any specific indexing discipline. Any term of reasonable significance can be used as a retrieval point. Second, once the item or items that match the search are located, they can be printed out at the terminal for immediate inspection. There is no additional wait while the desired items are located and supplied to the patron. Full-text searching is being used quite extensively for information retrieval in law. This technique is especially suited to legal materials, because virtually every word in a court decision can be significant. Furthermore, while legal items seem long, frequently only a few sentences are of interest to the patron and must be printed out. The major constraint on full-text searching currently is that it is expensive to store and search an entire text to find the relevant section. As storage costs continue to drop, more full-text searching will be used in the future.

A new development in information access that has not yet come to full fruition is the on-line journal. The combined developments of computer and communication technology have made it economical for researchers throughout the country to use a centrally located computer to store information and display it to any individual requesting it. This has enabled writers who are geographically dispersed to coauthor papers or reports without traveling. Computer conferencing is the general term for this technology, and it holds the seeds of full-text on-line storage of journals for the future.

Imagine that a group of researchers have jointly authored a paper (without ever seeing one another) and are ready to submit it to a journal. If they were to submit it to an on-line journal, they would simply send a message to the editor directing his attention to the computer file containing the text of the manuscript. Referees would read the manuscript from a computer printout and anonymously transmit their suggested revisions to the authors. The manuscript and all pertinent communications would be stored in a computer file. Once the article had been revised and was acceptable to the editor, its publication would be effected by incorporating the revised manuscript file into a collection of accepted

articles. These would constitute the current issue of the on-line journal. Interested readers could access the material on their computer terminals.

This development may give librarians many new tools for providing information about new articles. Full-text searching would be simpler since data input problems are minimal. Indexes could easily be prepared by computer programs. A possible innovation would be the use of readers as an indexing technique. By keeping a list of people who read an article and associating these readers with subject areas, it would be possible to assign subject headings to articles according to the interests of those who read them. It could even be possible to assign quality ratings by determining which articles respected researchers spent either very little or a great deal of time on. This could be done without violation of the privacy of one's reading habits by computer coding and tabulation.

The on-line journal would not only provide new retrieval tools, it would also end the document delivery problem. There would be no delay between the time that a patron learns an item exists and the patron's receipt of a printed copy of that item. As in the case of full-text searching, the main stumbling block here is that on-line storage is still expensive enough to keep the price of on-line journals beyond the means of many readers. In addition, publishers and other information industry companies are not sure they would benefit from this new technology. Thus, it may be some time before on-line journals actually enjoy widespread use. However, the basic computer conferencing technology that precedes it is in use now.

The increasing demand for information products and services has had its effect on librarians as well as on information companies and publishers. Virtually every librarian has encountered the situation in which a patron would like a service the librarian is trained to provide, but time limitations make its performance impossible. It might be verifying citations for a professor's publication, advising a schoolteacher on how to organize a personal record collection, or locating all sources of a specific product for a local business. Traditionally, such a task might be undertaken by a librarian or a competent assistant (for instance, a library science student) as an outside activity for extra income.

In the 1970s, new providers developed services that the library was not able to provide. Trained librarians, who either could not find other jobs or who found other positions less challenging, began to sell their expertise in information storage and retrieval directly to clients, calling themselves information brokers. Often these brokers are the first to offer on-line bibliographic data base searching directly to a client population.

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Brokers also do manual searches when a client does not wish to do the search himself. Another activity information brokers have undertaken is to provide the services of a corporate librarian to companies too small to afford full-time librarians. These services could include answering traditional reference questions (usually by telephone), doing literature searches, and providing current awareness literature, as well as using the brokers' skills in storage and retrieval to arrange a small company library to be maintained by company employees.

The information broker differs from the librarian in terms of focus rather than activity. There is no teaching function in brokering as there is in librarianship. The broker does the searching or organizing *for* the client, rarely with the client. Explanations of technique are given primarily to gain assistance from the client in clarifying the question, and to develop a better product of service for that client. The broker is in the business of selling information retrieval. The clients often don't care how the information is located as long as they get what they want. The client perceives the broker as delivering an information product even when what the broker is actually doing is using his or her skill to provide an information access service.

The development of these information entrepreneurs has had considerable influence on the library community. One agreeable effect is that there is now a place to which the librarian can refer a patron willing to pay for a service the library does not provide. Referral to an information broker, however, raises problems. There are situations in which referral is taken as endorsement of the broker's skill. There are areas in which several brokers work, and any one of them may resent the library's referral to another. Even when such situations are avoidable, however, there is no way to escape the problem arising from the fact that information brokers make their living by charging for information access services. What is the library to do about the patron in need of the service who cannot afford to pay for it? How can the library justify its refusal to do some things when the information broker, for a fee, will undertake any service activity for which he or she has the skills and ability?

There is also the problem of compensation to the library for use of its collection. Many information brokers depend on public or academic library collections, which are provided at public or institutional expense, to perform their work. Brokers maintain that they are not selling the material in the library, they are only selling access to that material. They sell the *delivery* of the desired information to their clients. But they are only able to deliver the information because the library provides a fine

collection. Should the brokers compensate the library for their use of its collection since they profit from that use? Some libraries actually have charged brokers for collection use. Many libraries hesitate to impose such user charges, as doing so might deny access to some researcher who needs the collection but cannot afford the fee. Also, how can the library separate the information broker from the other patrons who use the library? Don't researchers make their living in part from their use of the library? Why not ask them to pay, too?

The development of entrepreneuring in information provision has forced many libraries to consider not just the question of fees but several other serious questions. What is "appropriate" use by someone in the business of providing information? Is it proper for students to use an information broker's service? If not, then why is it acceptable for faculty? Are the traditional teaching functions of librarians no longer appropriate? These questions are very serious issues, even in places where no information brokers practice. The reason is that many libraries are either providing or considering provision of on-line bibliographic search service. These services generally must be provided at charge because of the substantial expense involved. Thus, the question of fees, and the question of performing the service for the patron rather than teaching the patron to do it for himself, are pressing issues for all librarians, not just for those who are considering whether to become, or support the activities of, information brokers.

Library entrepreneurs intent on offering services and products that will sell, especially to businesses, have caused many businessmen to take an interest in the importance of information to the smooth running of their affairs. Further, as management information systems become a standard part of the curricula of many business schools, it is becoming clear to many company executives that people who can manage information are very valuable employees. Finally, the need to keep records of transactions for tax reasons, for affirmative action documentation, or for compliance with various regulatory agencies has increased the demand for people who can advise companies on how to do this efficiently and economically.

Thus, the skills of librarianship and management have united to form a new breed of people able to attend to the information problems of businesses large and small. So important is the development of these skills to information industries that the IIA has formed a Program for Information Managers (PRIM) to help those working as information managers acquire and improve their skills. In addition, a new journal

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"exclusively designed for organizational information needs,"⁵ called *The Information Manager*, began publication in August 1978. The magazine carries advertising for products and services designed to meet the information needs of an organization. Also advertised are systems that will be valuable in solving the information-handling problems within the organization, as well as notices of information brokers who are selling their services as consultants.

Both information entrepreneurs and libraries have begun to offer their services in on-line data base searching to patrons. The use of large collections of citations makes possible rapid retrospective searching of substantial quantities of material. Librarians have been able to use this to advantage in several circumstances. Doctoral candidates, for instance, can use it to find out whether the idea they have developed for a thesis has already been done. Researchers studying phenomena amenable to bibliometric analysis can have large numbers of citations scanned for specific patterns which they hypothesize should develop under certain circumstances. In addition, it is now rather easy for a librarian, even at a very small institution, to create an on-line search using the profiled interests of library patrons. For a modest price, that search can be run against one or more specific data bases whenever there are updates to the data bases. Thus, selective dissemination of information is now within the realm of possible activities for many more libraries and their patrons than previously. The development of on-line bibliographic data bases has made possible the extension of many services to libraries and populations that could never have afforded them before. Furthermore, the speed of the response of these systems has made possible much more rapid determination of items available on a given subject.

Libraries have also found a new role in teaching students in some of the professions. It has been a long tradition that academic and school librarians try to teach use of the library to students. However, only recently have librarians been called upon to teach skills of information retrieval. In law school libraries, the teaching of full-text on-line retrieval systems such as LEXIS is now being done. It seems likely that business librarians will have the opportunity to enter the teaching arena with training on systems of statistical analysis of business trends, such as Predicasts. As information (as opposed to bibliographic) retrieval systems develop for more professions, librarians can expect more opportunities to share their special knowledge of on-line interaction with more kinds of patrons. The bibliographic retrieval specialty the librarians themselves can probably retain as a service for the library patrons.

It is a truism that nothing is certain but change. Since information reflects the social, political, economic and physical environments in which people find themselves, the quality of information changes as society changes. Change is a curious thing: it is at once man's greatest challenge and most potent nemesis. Without change and the challenge it brings, it is too easy to grow complacent, then bored and finally stale. Yet the old Chinese curse bids one to live in interesting times. The future for the information professional promises to be anything but uninteresting.

The new publics and services now developing, particularly computer services, are a reflection of both the technology of the times and the demand from all levels of society for more and better information. Large data collections have brought new services and new patrons. Librarians are now finding themselves partners in research in the sciences where it is the data, not just the report of their study by others, that are significant. Not only are librarians expected to find the needed material, but also to store information on what was collected and how, so that the researcher can use the data accurately and fully.

When the data are bibliographic citations, librarians are finding that the retrieval process is sufficiently complex that they can no longer instruct most patrons in retrieval and so must do it for them. Thus, all librarians are in some ways approaching the activities of information brokers. Once the citations have been procured for them, the patrons are seeking ways to retrieve the material just as quickly. Those who enter the information industry are therefore challenged to find better and faster ways to deliver desired material, and those who choose the traditional librarian role are challenged to direct their patrons to the most reasonable and efficient supplier of the material wanted.

Nor is the librarian done with just those activities. While the traditional role of instructing in the use of indexes, abstracts and other printed references may fade with increased use of on-line bibliographic searching, the teaching function will not die out. For effective retrieval, the full-text systems require all the skill and understanding that reference and on-line search instructors can instill in librarians. As more users begin to employ full-text searching themselves, more instruction in effective use of such systems will be needed.

In many circles of society, information is not so much a matter of emerging importance as of emerged importance. What else can explain the expenditure on information of nearly half the country's GNP? Information professionals have the opportunity to be in the forefront of new developments, but only if they are willing to face the challenges the new

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developments present. The years ahead may prove to be too interesting at times, but surely will never be boring.

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5. *The Information Manager*. Rodd S. Exelbert, ed. Information & Records Management, Inc., 250 Fulton Ave., Hempstead, N.Y. 11550. 1978- . (masthead)